

#326

PIONEER 10

DOPPLER TRACKING DATA

72-012A-09A

#326

PIONEER 10

DOPPLER TRACKING/SOLAR OPPOSITION

72-012A-09B

PIONEER 10

DOPPLER TRACKING DATA ON MAG TAPE

72-012A-09A

This data set has been restored. There was originally one 7-track, 800 BPI tape written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tape was created on an IBM 360 computer and the restored tape was created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D number are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005630	DS005630	D022352	1	10/05/73 - 12/28/73 (a)

(a) D022352: Read errors occurred in records 27, 1982, 1986, 1990, 1991, 1994 of file 1.

REQ. AGENT
CMP

RAND NO.
RC4715

ACQ. AGENT
CDW

PIONEER 10

DOPPLER TRACKING DATA

72-012A-09A

This data set consists of 1 tape written in binary, and odd parity. The tape is 7 track with a density of 800 BPI and was created on a UNIVAC 1108 computer. There is one file of data on the tape.

<u>D#</u>	<u>C#</u>	<u>TIME SPAN</u>
D-22352	C-17288	10/05/73 - 12/28/73

DATA TAPE FORM

DATA TAPE FORM

APPENDIX A

OD FILE LOGICAL RECORD FORMATS

OD files are existed in two formats; type-66 format and LGFIO format. The OD file generated by the ODE is in type-66 format. It has to be converted to LGFIO format by the CONVRTDRIVE before the ODP can use it. The following sections describe both formats of OD files in detail (word, type, contents and description).

A. 1 OD FILE IN TYPE-66 FORMAT

1) FILE IDENTIFICATION GROUP

1.1) Header Record

1	I	11	Size (in integer words) of each logical record in 1.2.
2	I	4	Identifies content of 1.2 records as Fieldata.
3	I	1	Indicates group does not end with a trailer record.
4	I	101	File id. group indicator.
5	I	0	Not used.

1.2) One Record which Identifies the File

1	I	10	The number of integral words in the record.
2-4	Fieldata	"SPACECRAFT ID = nn" where nn is the spacecraft number input by the user in the OD statement.	
5-9	Fieldata	"Y, M, D, H, M = yy, mm, dd, hh, mm, 1108" for identifying the time and system the file was written.	
10-11	Fieldata	"ODE = vv, v" for identifying the version of ODE that created the file.	

2) FINGERPRINTS GROUP (May not be present)

2.1) Header Record

1	I	8	Size (in integer words) of each
---	---	---	---------------------------------

logical record in 2.2.

2	I	4	Identifies content of 2.2 records as Fieldata.
3	I	0	Indicates group ends with a trailer.
4	I	102	Fingerprint group indicator.
5	I	0	Not used.

2.2) One or More Records of Fieldata Fingerprints

1	I	7	The number of integral words in the record.
2	Fieldata	Unique run-id (left justified).	
3	Fieldata	Date when file was written - MMDDYY.	
4	Fieldata	Time when file was written - HHMMSS.	
5	Fieldata	Name of program wrote this file (right justified).	
6	Fieldata	Version of the above program (left justified).	
7	Fieldata	Date when above program was mapped - MMDDYY.	
8	Fieldata	Time when above program was mapped - HHMMSS.	

2.3) Group Trailer

1	I	1	
2	Fieldata	'000000' (Six Fieldata zeros)	

3) USER LABEL GROUP

3.1) Header Record

1	I	15	Size (in integer words) of each logical record in 3.2.
2	I	4	Identifies content of 3.2 records as Fieldata.
3	I	0	Indicates group ends with a trailer.
4	I	103	Label group indicator.
5	I	0	Not used.

3.2) One or More Records of Fieldata Descriptive Text

These include the text generated by the ODE and input to the ODE by the user via the LABEL parameter in the OD-FILE statement. The text generated by the ODE describes when the file was created or updated. The text input by the user is any comments the user would have concerning the circumstances under which the file was created.

1	I	14	The number of integral words in the record.
2-15	Fieldata	84	Fieldata characters text.

3.3) Group Trailer

1	I	1	
2	Fieldata	'000000'	(Six Fieldata zeros)

4) RAMPED TRANSMITTER GROUPS (May not be present)

4.1) Header Record

1	I	129	Maximum size (in integer words) of each logical record in 4.2
2	I	2	Identifies data records as double precision
3	I	0	Indicates group ends with a trailer record
4	I	2030	Key 1
5	I	DSN Station Number or 0	Key 2

4.2) A Series of Data Records

Each data record shall consist of an integer NWORDS plus up to 16 packed transmitter messages. Each transmitter message will contain four double precision words as follows:

D.P. Word

1	T_o , Beginning time of ramp in seconds past 0 ^h 1 January 1950.
2	T_f , End time of ramp in seconds past 0 ^h 1 January 1950.

D.P. Word

- 3 DCO transmitter frequency in Hz at T_o (≈ 45 MC)
[$f_{VCO} = (f_{DCO} + 20$ MHZ)/3]
- 4 DCO frequency rate to be applied between T_o and T_F ,
Hz/sec.

4. 3) Group Trailer

1	I	I
2, 3	DPFP	0.0D + 0

5) ORBIT DATA SUMMARY GROUP

5. 1) Header Record

1	I	9	Size (in integer words) of each logical record in 5. 2.
2	I	2	Identifies content of 5. 2 records as DPFP.
3	I	0	Indicates group ends with a trailer.
4	I	105	Orbit data summary group indicator.
5	I	0	Not used.

5. 2) A Record for Each Data-Type that Exists for Each Station/Band

1	I	4	Number of DPFP words in the record
2, 3	DPFP	1.0000000bc00e0ffD+16	where

b = radio band indicator (See Orbit Data Group)

c = tracking network indicator (See Orbit Data Group)

ee = receiving station number

ff = data-type indicator (See Orbit Data Group)

4,5	DPFP	Number of points	Seconds after January 1, 1950 0:0:0.0
6,7	DPFP	Time of earliest point	
8,9	DPFP	Time of latest point	

5. 3) Group Trailer

1	I	1
2,3	DPFP	0.0D+0

6) ORBIT DATA IDENTIFIER GROUP

6. 1) Header Record

1	I	6	Size (in integer words) of each logical record in 6. 2.
2	I	4	Identifies content of 6. 2 records as Fieldata.
3	I	1	Indicates group does not end with a trailer record.
4	I	107	Orbit data identifier group indicator
5	I	0	Not used.

6. 2) One Record which Identifies the Various Fields and Their Positions within the Orbit Data Record .

1	I	5	Number of integral words in the record.
2	Fieldata	TIMTAGIDWORDOBSVBLFREQCYPASSID	

7) ORBIT DATA GROUP

7.1) Header Record

1	I	241	Size (in integer words) of largest logical record in 7.2.
2	I	2	Identifies content of 7.2 records as DPFP.
3	I	0	Indicates group ends with a trailer
4	I	109	Orbit data group indicator
5	I	0	Not used

7.2) A Series of Records (possibly void):

1	I	M	The number of double precision words of data in the record. M=120 except possibly for the last record in which M=R*5 where R is the number of logical records within the record.
2 to 2M+1	DPFP	M/5	logical records

A logical record is as defined below

Orbit Data Logical Record

<u>Words</u>	<u>Mode</u>	<u>Contents</u>
--------------	-------------	-----------------

1,2	DPFP	Time of observation; seconds after January 1, 1950 0:0:0.0
-----	------	--

3,4	DPFP	1.aaaaaaaaabcddeeffD+16
-----	------	-------------------------

where

aaaaaaaa = doppler compression time in hundredths of seconds for doppler data
= 0 for DRVID
= ranging components for range data
= 0 for angle data

- b = radio band indicator. 1 = S, 2 = X,
3 = L, 4 = LS
- c = tracking network indicator. 1 = DSN,
2 = MSFN, 3 = ETR
- dd = transmitting station number
- ee = receiving station number
- ff = data-type indicator
 - 11 = one-way doppler (F1)
 - 12 = two-way doppler (F2)
 - 13 = three-way doppler (F3)
 - 14 = three-way coherent doppler (F3C)
 - 24 = DRVID using TAU ranging (DTAU)
 - 25 = DRVID using MU ranging (DMU)
 - 26 = DRVID using PLOP ranging
(DPLOP)
 - 27 = DRVID using PLOP2 ranging
(DPLOP2)
 - 28 = DRVID using MU2 ranging (DMU2)
 - 31 = ETR range (ETR)
 - 32 = MARK 1 range (MARK1)
 - 33 = MARK1A range (MARK1A)
 - 34 = TAU range (TAU)
 - 35 = MU range (MU)
 - 36 = planetary operational discrete
spectrum (PLOP)
 - 37 = planetary operational continuous
spectrum (PLOP2)
 - 38 = planetary R&D (MU2)
 - 51 = azimuth (AZ)
 - 52 = elevation (EL)
 - 53 = hour angle (HA)
 - 54 = declination (DEC)
 - 55 = X30 (X30)

56 = Y30 (Y30)

57 = X85 (X85)

58 = Y85 (Y85)

5,6 DPFP One of the following

- i) doppler observable
- ii) DRVID observable
- iii) range observable
- iv) angle observable

7,8 DPFP Reference frequency for doppler, DRVID and range data, 0 for angle data, where reference frequency is defined as the frequency of the

- i) Transponder if doppler ground mode is one-way
- ii) Transmitter if doppler ground mode is two-way, three-way, or three-way coherent. Reference frequency is taken at light corrected time of data point.

9,10 DPFP 1.aaaabccD+16

where

aaaa = Pass identification

b = Split pass identification

cc = Spacecraft identification

The logical data records are ordered in increasing order of time/net/station/data type/band.

7.3) Group Trailer

1 I 1

2,3 DPFD 0.0D+0

8) CONTROL STATEMENT GROUP

8.1) Header Record

1 I 15 Size (in integer words) of each logical record
in 8.2.

2	I	4	Identifies content of 8.2 records as Fieldata.
3	I	0	Indicates group ends with a trailer
4	I	111	ODE control statement group indicator
5	I	0	Not used

8.2) Fieldata Card/Line Images of All the ODE Control Statements

1	I	14	The number of integral words in a record
2-15			Fieldata 84 Fieldata character text.

8.3) Group Trailer

1	I	1	
2			Fieldata '000000' (Six Fieldata zeros)

9) FILE CLOSE GROUP

9.1) Header Record

1	I	1	
2	I	5	
3	I	0	
4	I	0	
5	I	0	

9.2) End of File Mark

The entire OD file is written and read with non-formatted (binary) read and write FORTRAN V statements. The data within each record are ordered and typed as specified above; the various file groups are also ordered as shown in paragraphs (1) through (8).

PIONEER 10

DOPPLER TRACKING/SOLAR OPPOSITION

72-012A-09B

This data set has been restored. There was originally one 9-track, 6250 BPI tape written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The tape was created on an IBM 1100 computer. The DR and DS numbers along with the corresponding D number and the time span is as follows:

DR#	DS#	DD#	FILES	TIME SPAN
DR03734	DS03734	D54507	11	11/13/81 - 12/09/81

<u>REQ. AGENT</u>	<u>REQ. NO.</u>	<u>ACQ. NO.</u>
DEW	V0169	WSC

PIONEER 10

DOPPLER TRACKING / SOLAR OPPOSITION

72-012A-09B

THIS DATA SET CATALOG CONSISTS OF ONE TAPE. THE TAPE WAS CREATED ON A UNIVAC 1100/81 COMPUTER. THE TAPE IS 6250 BPI, 9 TRACK WITH 11 FILES OF DATA. THE D AND C NUMBERS ARE AS FOLLOWS:

<u>D*</u>	<u>C*</u>	<u>TIME SPAN</u>
D-54507	C-22914	11/13/81-12/09/81



JET PROPULSION LABORATORY *California Institute of Technology • 4800 Oak Grove Drive, Pasadena, California 91103*

28 September 1982

Mr. Ralph Post
National Space Science Data Center
Code 601.1
NASA - Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mr. Post:

This letter is to notify you that I have mailed a magnetic tape containing Pioneer 10 Doppler tracking data to you at the National Space Science Data Center (NSSDC). These data, which cover the period 13 November - 9 December 1981, were taken during solar opposition for the Pioneer 10 Celestial Mechanics Experiment (Dr. J. D. Anderson, JPL, principal investigator). They represent the data record for a gravitational radiation search during the 1981 opportunity. The tape you will receive (tape A2403) was written at JPL on a UNIVAC 1100/81 computer in the standard 9 track, 6250 BPI mode. Please send a replacement tape to me at the address given above.

The tape A2403 has eleven (11) files of tracking data (see Table 1). These files were created by E. L. Lau of JPL by stripping the respective IDR tapes and writing directly onto the file using the subroutine PUTREC (see JPL publication 1843-1: LIB*CLIB\$, Special Feature Subroutine Library). Each data point consists of five double precision words: time in seconds past January 1, 1950, 0^h; station number; tracking mode; Doppler cyclecount; and pseudo-residuals. These data are written in 36-sector blocks of 100 points each (500 double precision words and 4 null DP words at the end).

Please instruct any potential users of the data to contact me if any questions arise concerning its use.

Sincerely yours,

A handwritten signature in black ink that reads "James M. Rotenberry".

James M. Rotenberry
Engineer III
Solar System Dynamics Group
(213) 354-3885

JMR:nc

cc: J. D. Anderson
E. L. Lau
C. Leidich (ARC, 5 copies)

W. L. Sjogren
J. Weber (U. of Maryland)

JET PROPULSION LABORATORY *California Institute of Technology • 4800 Oak Grove Drive, Pasadena, California 91103*

Mr. Ralph Post

-2-

28 September 1982

TABLE 1

<u>FILE NAME</u>	<u>SIZE</u>	<u>TIME PERIOD SPANNED BY FILE (UTC)</u>
49296*IK8223.	739 tracks	04:03 DOY 317 - 04:30 DOY 320
49296*IK8253.	790 tracks	23:30 DOY 319 - 20:50 DOY 321
49296*IK8282.	905 tracks	09:01 DOY 322 - 04:30 DOY 324
49296*IK8339.	1351 tracks	23:30 DOY 323 - 04:30 DOY 327
49296*IK8376.	958 tracks	23:30 DOY 326 - 04:30 DOY 329
49296*IK8412.	1028 tracks	23:30 DOY 328 - 04:30 DOY 331
49296*IK8447.	1538 tracks	23:30 DOY 330 - 04:30 DOY 334
49296*IL8009.	1005 tracks	23:30 DOY 333 - 02:40 DOY 336
49296*IL8034.	889 tracks	23:30 DOY 335 - 04:30 DOY 338
49296*IL8101.	1623 tracks	23:30 DOY 337 - 04:30 DOY 341
49296*IL8142.	641 tracks	23:30 DOY 340 - 04:30 DOY 343

Note: 04:03 DOY 317 = 4:03 a.m., GMT 13 November 1981.

= 1005624180, seconds past January 1, 1950, 0^h ET.

D54507
11/13/81 - 12/19/81

